Oct. 26, 1971 E. A. NORDELL 3,614,871

METHOD APPARATUS, AND DOCK MEMBER COMPONENTS FOR ERECTING, ALIGNING, REALIGNING, OR DISASSEMBLING A DOCK MEMBER

Filed June 14, 1968 2 Sheets-Sheet 1

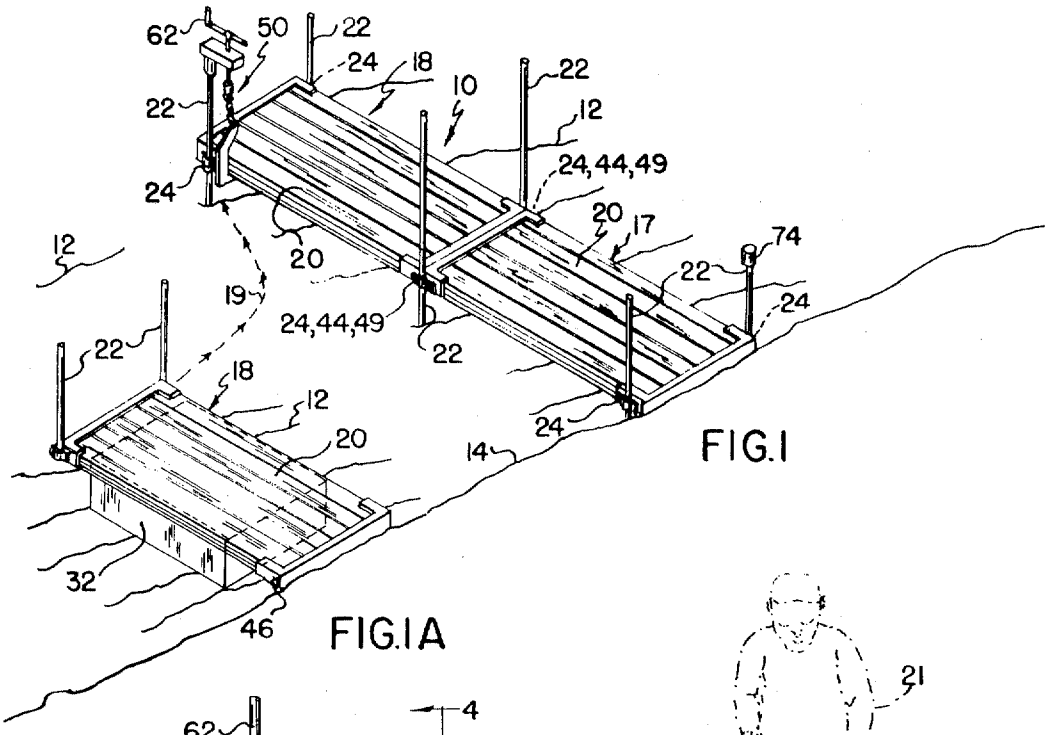


FIG.1

FIG.1A

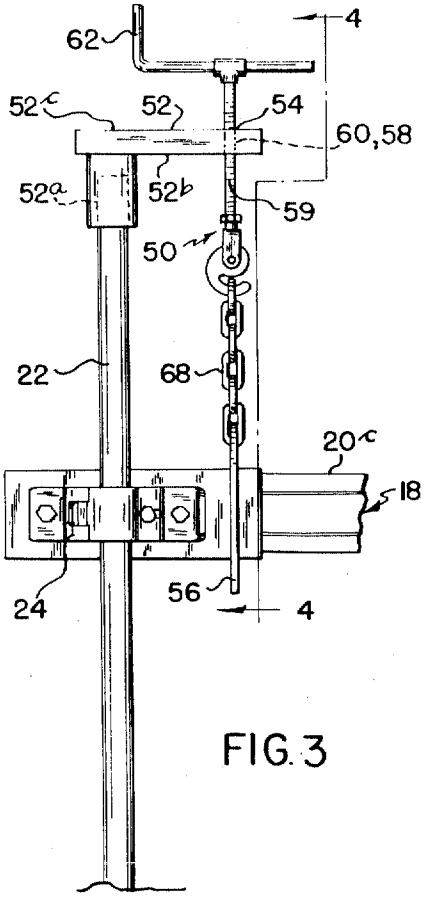


FIG. 3

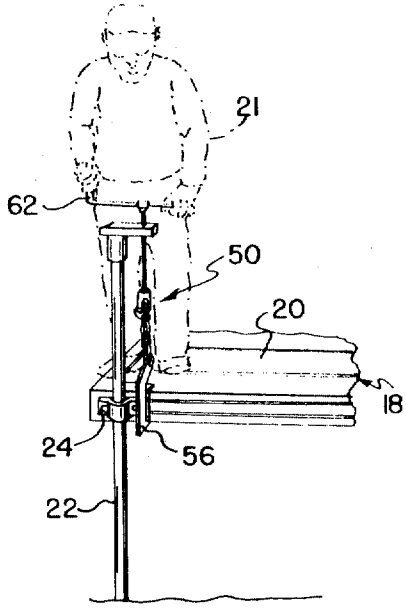


FIG. 2

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METHOD APPARATUS, AND DOCK MEMBER COMPONENTS FOR ERECTING, ALIGNING, REALIGNING, OR DISASSEMBLING A DOCK MEMBER

Filed June 14, 1968 2 Sheets-Sheet 2

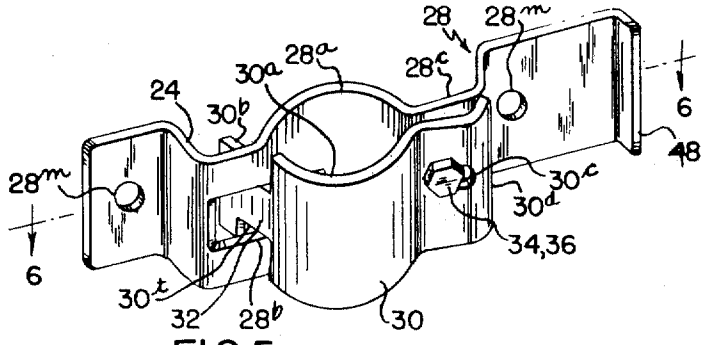


FIG.5

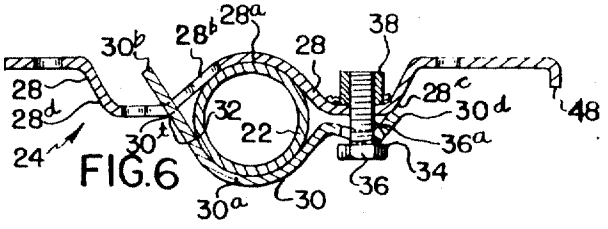


FIG.6

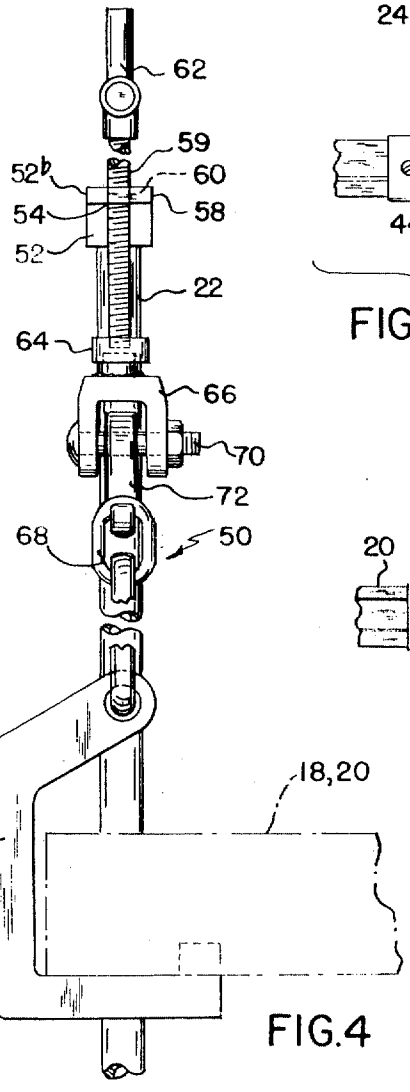


FIG.4

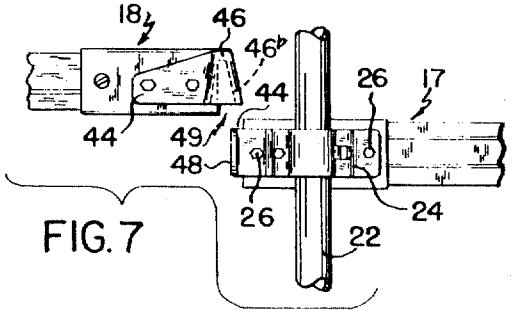


FIG.7

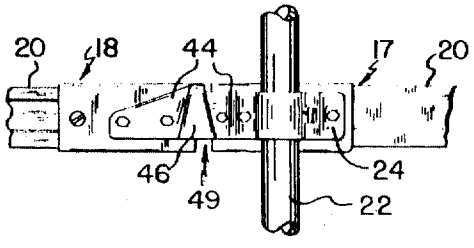


FIG.8

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METHOD APPARATUS, AND DOCK MEMBER COMPONENTS FOR ERECTING, ALIGNING, RE-ALIGNING, OR DISASSEMBLING A DOCK MEMBER

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Filed June 14, 1968, Ser. No. 737,159
Int. Cl. E02b 3/20
U.S. Cl. 61—48 5 Claims

ABSTRACT OF THE DISCLOSURE

Method, apparatus and dock member component or components for erecting, disassembling, aligning and/or realigning a dock member easily erectable (as a complete dock, a modular dock component, or an extension of on an existing dock) by a single person even in deep water without the use of boats and without getting wet; and including a dock deck elevator, dock member post clamp bracket, a connector for operatively connecting two dock members, and/or combination member connector and post clamp bracket, etc.

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to docks, whether made up of a single dock member or a plurality of dock members in any selected alignment, and relates especially to easily erectable docks and dock members.

A brief description of one way of erecting a prior art dock member may be helpful in better understanding the advantages of the present invention. A dock member, comprising deck **20** (mentioned here as only one example of a suitable deck and not as prior art since the specific deck **20** shown is part of my copending patent application, as mentioned hereafter) and posts **22**, to be described hereafter in the present invention, have been used here for purposes of explanation of the prior art. Four posts **22**, one secured to each corner of deck **20** by a conventional strap type clamp, can be used on deck **20** with each post **22** extended approximately the distance below deck **20** expected to be needed in the erected position shown in FIG. 1. Then, at least four men, one at each deck corner (and possibly eight or more men, four on each side if the dock member is heavy) wade out into the water and place the dock member in proper position. If any of the posts have to be driven into the river or lake bottom, suitable scaffolding must be provided at each post to permit driving the top thereof with a sledge hammer. Alternatively, two men in a boat, one guiding or paddling the boat and the other swinging a sledge hammer while standing in the boat may drive in each post **22** if the top thereof is not too far above water level. After all four posts **22** have assumed a proper vertical position, it is necessary to align deck **20** and move it into its final erected position. Now, at least the four men, one in each corner, loosens their post strap clamps and move their corners of deck **20** up or down to move the top surface of deck **20** into its erected and aligned position, such as level, with respect either to the ground or to the top deck surface of any other associated dock member. When this final erected position is reached, each man then must tighten his strap clamp to secure his post **22** in position before wading back towards shore. Then, this procedure must be repeated for each dock member. It should be apparent that at best this procedure is only good for erecting a dock in shallow water; if deep water erection is desired, it might be necessary to have four boats, one at each corner of deck **20** and filled with men, to provide the erection.

Erection and alignment of a prior art dock generally requires a plurality of men, a whole crew, working either in boats or in the water surrounding the dock. This can cause great expense and inconvenience to someone erecting and aligning a dock on a minimum budget, such as a week-end type, lake or water resort cottage or cabin dweller who normally lives in a home in a city many miles away from the resort. He may not yet own a boat or may be erecting the dock solely for swimming or fishing purposes with no intentions of buying or renting a boat. Requiring an erection and alignment crew means that he must either pay a large labor charge or invite many friends out for the week-end to help him around the cottage or cabin, which might be too small to house them. He would have to go to the same inconvenience and expense whether he was building a full dock, adding an extension to his existing dock, aligning or realigning a dock, repairing his existing dock, disassembling or taking in an existing dock in the fall to avoid winter ice and high spring waters or flood waters and subsequently re-erecting and realigning the dock, etc.

The present invention permits a single man **21** to erect and to align a complete dock, or to add an extension to an existing dock, while working alone and without having the inconvenience or expense of a boat, dock erection helpers, wading or swimming in the water around the dock, or getting wet. He also will not have these inconveniences or expenses if he finds it necessary to realign the dock, or any component dock member thereof, as to location or heighth after misalignment caused by swift current, settling, ice, etc.; or if he finds it necessary or desirable to disassemble and bring in the dock, or any component dock member thereof, in the fall or before flood to protect the dock from damage and subsequently re-erect and realign it in the spring or after the flood.

An object of the present invention is to provide a method and apparatus for erecting, aligning or realigning of the dock member as a component part of a dock or as a complete dock.

A further object of the present invention is to provide a connector between component dock members of the dock adapted to permit easier assembly, erection, alignment, realignment or disassembly of the component members and to permit misalignment to occur therebetween during dock usage by settling.

A further object of the present invention is to provide a combined dock member connector component and post clamp bracket providing a plurality of advantages.

A further object of the present invention is to provide a method or apparatus for erecting a dock member or members, or a component of a dock, characterized by ease of assembly, erection and take down of component parts and docks members; structural simplicity; inexpensive construction; compactness on disassembly for shipping; strong and sturdy nature; ease of operation or use; multiplicity of functional advantages for some component parts; etc.

These and other objects, novel features and additional advantages of the present invention will become more clearly apparent by reference to the appended claims as the following detailed description and discussion proceeds in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing,

FIG. 1 is a perspective view of two connected together, erected and aligned dock members having thereon apparatus and component parts of the present invention;

FIG. 1A is a perspective view of a dock member being moved on a float at shore before being moved into intermediate and subsequently erected positions during dock member erection;

FIG. 2 is a perspective view showing the dock deck elevator of the present invention in use;

FIG. 3 is an enlarged, side elevational view of a portion of FIG. 2 of the dock deck elevator;

FIG. 4 is an enlarged view of the deck elevator with portions broken away, with the top operating crank turnable, taken generally along the line **4—4** in FIG. 3, and showing a portion of the deck outline in dot dash lines;

FIG. 5 is a perspective view of the combined connector component and post clamp bracket part of the present invention;

FIG. 6 is a horizontal sectional view taken generally along the line **6—6** in FIG. 5 with this clamp bracket clamped on a dock post;

FIG. 7 is a side elevational view of the part in FIG. 5 operatively connecting a dock member deck and one of its supporting posts and aligned for assembly with the other dock member connector component shown slightly above and to the left thereof; and

FIG. 8 is a side elevational view of FIG. 7 with the connector components assembled to align the decks of the now connected dock members.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Dock **10** in FIG. 1 is shown erected in water **12** (such as a lake, river, etc.) extending out from shore **14**. Dock **10** may comprise one or more dock members, here shown specifically as interconnected dock members **17** and **18** as dock modules in erected and aligned position with the top surfaces in FIG. 1 of their decks **20** aligned coplanar for walking on dock **10**.

Each dock member **17** or **18** includes deck **20** of any suitable form (such as that shown by deck portion **16** in my copending U.S. patent application Ser. No. 721,386, filed Apr. 15, 1968, an entitled "Dock Structure" to which further reference may be made, and the disclosure of which is incorporated herein by this reference to that pending patent application); and supporting posts **22** clamped to one or more edges of deck **20**, each by a dock member post clamp bracket **24** secured to deck **20** by bolt and nut units **26**. An "edge" of deck **20** is defined as including a side, end, or corner of deck **20**. Some aspects of this invention are obtainable if only one post **22** supports only one end edge of a dock member.

Four brackets **24** and posts **22** are on dock member **17**, and two brackets **24** and posts **22** are on dock member **18** in FIG. 1.

Dock **10** may comprise dock members **17** and **18** in any desired final alignment, including T formation, straight line (shown in FIG. 1), standing alone, etc. with their (or its) top, deck, walkway surfaces in any desired alignment including level, uphill, downhill, one level and the other uphill or downhill, uphill and downhill, arranged in step-like formation at their abutting ends in FIG. 1, etc. "Align" or "realign," or any variation of these words as used herein, include not only any of these final alignments mentioned heretofore in this paragraph but also in a broad sense any partially aligned or partially erected positions (located between completely disassembly and fully erected and finally aligned position), such as (1) when one outer corner edge of deck **20** has been raised into level position in the twelfth and thirteenth erection steps (these erection steps being described hereafter) but the other corner has not yet been raised to level position by the fifteenth erection step, or (2) just before or after engagement of connector components **46** and **48** in FIGS. 7 and 8 during assembly (in the fourth erection step) or disassembly or dock members **17** and **18**. Even a partially aligned or erected position is a selected position of alignment which the dock members occupy on their way into finally aligned position. It should be apparent that even a single dock member **17** or **18** may be aligned, realigned, erected or disassembled since these functions are being performed relative to the ground bottom below body of water **12**, eventhough a second dock member is not involved. "Realigning" includes moving a dock member either back to its original alignment or into a new alignment now desired.

Each post clamp bracket **24** is constructed to permit vertical movement of its post **22** relative to deck **20** so that each post may be moved from a retracted position shown in FIG. 1A into dock member supporting position in the erected and aligned dock member position shown in FIG. 1.

Each bracket **24** includes base element **28** secured by two pairs of bolt and nut units **26** through holes **28***m* to the edge of its associated deck **20** and having arcuate recess **28***a* between its ends; and includes post gripper element **30** having corresponding arcuate recess **30***a* between its ends with each arcuate recess being less than a semi-circle.

Each bracket **24** also includes a pair of disengageable connecting means **32** and **34**, detachably connecting elements **28** and **30** together with one of these connecting means being located on each side of recesses **28***a* and **30***a* so that recesse **28***a* and **30***a* are associated to embrace the associated dock post **22** by a clamping action.

Connecting means **32** comprises an easily assemblable hinge means provided a fulcrum during clamping or pulling elements **28** and **30** into clamping relationship on their associated posts **22** by tightening connecting means **34**, comprising a screw and nut type connector having bolt **36** and nut **38**. Hinge or connecting means **32** has T-shaped tongue **30***b* on element **30** adapted to have its tank **30***t* slidably held within slot **28***b* in element **28** elongated in a plane transverse to associated post **22**. Also, bolt **36** has its shank **36***a* extending through slot **30***c* in element **30** elongated in the same transverse plane and the threads on its shank screwed into nut **38** welded or otherwise secured in the concave portion of hump **28***c* on element **28** while the cross bar of T-shaped tongue **30***b* is located within the concave portion of hump **28***d* of element **28** so as to have sufficient clearance under hump **28***d* to provide a free hinging action without interference by deck **20**. It should be apparent that when bolt **36** is disengaged from nut **38**, the cross bar of tongue **30***b* may be detachably disengaged from or assembled into slot **28***b* in the position shown in FIG. 5 by merely rotating the plane of T-shaped tongue **30***b* about an axis (generally being the vertical, central axis of the T) until this plane coincides with one of the diagonals of slot **28***b* to permit moving the cross bar of the T-shaped tongue **30***b* through slot **28***b* since slot **28***b* has sufficient length (in the plane transverse to its associated post **22**, as viewed when assembled therewith, as shown in FIG. 3) to permit this action when clamp bracket **24** has neither bolt **36** nor post **22** assembled therewith. Hence, elements **28** and **30** will be held together by T-shaped tongue **30***b* of hinge means **32**, even when bolt **36** is removed, to prevent loss of loose element **30**, such as by dropping in the water, when bracket **24** is thus in the unclamping position. Also, the only loose part is bolt **36** since nut **38** is welded in the concave portion of hump **28***c*, and therefore only bolt **36** need be tightened (when clamping post **22** in bracket **24**) for simplicity of operation. Recesses **28***a* and **30***a* embrace, and tightly clamp, post **22** in the position shown in FIGS. 3 and 6.

It should be apparent that when bolt **36** is loosened, its associated post **22** may be raised or lowered relative to its associated deck **20** by telescoping through embracing recesses **28***a* and **30***a*; and if all bolts **36** on that particular deck member are loosened, the whole deck **20**, for example, may be raised or lowered to different erected positions in FIG. 1.

If desired, connecting means **32** may be made the same as connecting means **34**, namely of bolt **36** and nut **38**; but hinge **32** is the preferred construction since then only bolt **36** need be tightened.

If bracket elements **28** and **30** and post **22** are made of aluminum, a stainless steel insert may be used therebetween to prevent freezing of aluminum against aluminum,

but such stainless steel insert is not required with the present construction of clamp bracket **24** since each recess **28***a* and **30***a* is less than a semi-circle and extends less than 180° around its associated post **22** so that these recesses **28***a* and **30***a* will have no tendency to lock up on post **22** since recess **30***a* can be pealed off post **22** after screw **36** has been loosened and post **22** can be laterally pulled out of recess **28***a*.

Lip **30***d* on element **30** bears on the top surface of element **28** above hump **28***c* so that tightening bolt **36** will cause lip **30***d* to act as a fulcrum and bend element **30** intermediate its ends (because of the space between elements **28** and **30** around bolt shank **36***a*) for pulling recess **28***a* toward recess **30***a* to more tightly secure post **22** therebetween. Elongated slot **30***c* permits this movement.

ERECTION, ALIGNMENT, REALIGNMENT OR DISSASSEMBLY OF ONE OR MORE DOCK MEMBERS 17 AND 18

Since erection of dock member **18** is best illustrative of the present invention, the major portion of the following description will be directed to the erection of dock member **18** as an additional dock member or an extension on existing and earlier erected dock member **17**. Then, a brief comment will be given near the end of this description on how this same erection method could have been used earlier to erect dock member **17**. The description will be primarily directed to the method steps for erecting and aligning dock member **18** and coupling or connecting this additional dock member **18** to existng dock member **17** wth the top surfaces of their decks **20** aligned and with each in erected and aligned position; and the apparatus and/or dock structure comprising connectors **34** for connecting additional dock member **18** to existing dock member **17** with their deck surfaces thus aligned in erected and aligned position, deck elevator **50**, and dock member post clamp brackets **24** either for raising or lowering into, or for permitting raising or lowering into and clamping in, the erected and aligned position shown in FIG. 1 deck **20** of addtional dock member **18** relative to its two outermost deck supporting posts **22**. It will be apparent that these method steps (or the reverse thereof), apparatus or dock components, or suitable components thereof, can be used to erect, align, realign or disassemble one or more dock members in any selected alignment.

Now will be described sequentially and by numbers the steps of erecting, assembling, or aligning dock member **18** from disassembled position through different partially erected, aligned and intermediate positions. However, it should be apparent that generally the reverse of this described sequence can be used by one man to disassemble and return to shore all components of dock member **18** by going through generally these same partially erected, aligned and intermediate positions to disassembled position. It will be apparent, as the description proceeds, that one man, working alone can erect or assemble, and may subsequently disassemble or take down, dock member **18** even in deep water, without a boat, and without getting wet.

Dock member **18** is erected and aligned by the erection and alignment steps given hereafter.

First, two posts **22** in FIG. 1A are secured to deck **20** in their post elevated or retracted position shown in FIG. 1A while deck **20** is on shore **14** in this partially erected and aligned position. Each post **22** is telescoped into coacting recesses **28***a* and **30***a* of its associated post clamp bracket **24**, and then its associated bolt **36** is tightened to clamp the post, as shown in FIGS. 1A and 6.

Now, dock member **18** is moved by man **21** into an intermediate, partially erected, or aligned position generally vertically aligned with the erected and aligned position thereof shown in FIG. 1 and with both posts **22** at the outer end of dock member **18** outwardly extended by going through the hereafter described second, third, fourth, fifth and sixth steps.

Second, additional dock member **18** is placed on float or float means **32** in water **12** to support floatingly dock member **18** in this partially erected and aligned position. Float **32** may be a solid, right parallelepiped in peripheral shape, floatable plastic foam block **32** (such as polystyrene, commonly bearing the trademark Styrofoam) or of other suitable floatable material.

Third, dock member **18** is floated along path **19** from FIG. 1A to FIG. 1 into an intermediate or partially erected and aligned position ready for final erection into the erected position shown in FIG. 1 by float **32** located under deck **20** thereof. This can most easily be done by man **21** guiding floating dock member **18** over toward the edge of dock member **17**, walking out on dock member **17**, and then guiding dock member **18** to approximately the position shown in FIG. 1 while standing, kneeling or sitting on dock member **17**. Alternatively, the dock erector can climb out onto the top surface of floating deck **20** of dock member **18** in FIG. 1A and guide dock member **18** as a raft out into this position by either paddling or pulling along the edge of dock member **17**. However, this procedure is not preferred because it would require a larger float **32** to support the full weight of the erector.

Fourth, additional dock member **18** is connected by a pair of connectors **44** in FIGS. 7 and 8 to existing dock member **17** with their decks **20** aligned in a partially erected and aligned position for movement into the erected and aligned position shown in FIG. 1.

A pair of (two) connectors **44** are provided with one connector **44** located at each side of dock members **17** and **18** and with these connectors straddling the abutting ends of members **17** and **18** in the middle of dock **10** in FIG. 1. This pair of connectors **44** is made up of a left hand connector and a right hand connector, being mirror images of each other, with only left hand connector **44** being specifically shown in FIGS. 7 and 8. Each connector **44** has a socket connector component **46** bolted to the side of dock member **18** near its inner end and an ear connector component **48** formed as an integral part of post clamp bracket base element **28** at the outer end of dock member **17**.

It should be apparent now to dock erector **21**, kneeling on deck **20** at the outer end of dock member **17**, may couple to the supported outer end or edge of existing dock member **17** the inner end or edge of additional dock member **18** (remote from its two outer supporting posts **22** in FIG. 1) by raising the inner end or edge of dock member **18** and detachably engaging downwardly open socket **46***b* of connector component **46** over ear connector component **48** in each connector **44**.

Each connector **44** has sufficient clearance between the inter-connected surfaces of its socket **46***b* and ear **48** to provide a free knee-action in the up or down direction (in a plane extending generally perpendicular to the top or walkway surface of their decks **20** and extending in the same direction as the lengths of these decks **20** in FIG. 1) but not sideways, so that a limited relative movement or misalignment of decks **20** on dock members **17** and **18** in FIG. 1 can occur without damage, and so that additional dock member **18** can be more easily erected, aligned, realigned or disassembled whenever desired. This knee-type action coupling by connectors **44** permits raising and lowering of the outer or post end of deck **20** of additional dock member **18** by deck elevator **50**, as will be described hereafter in the twelfth step hereafter described in the dock erection method. This knee action permits an easier installation, alignment or erection; permits easier subsequent disassembly or removal of dock member **18**; permits uneven settlement of dock members **17** and **18** during use of the dock without breaking connector components **46** and **48** or doing damage to dock members **17** and **18**; and permits easy realignment of dock members **17** and **18**.

Now, it should be apparent that two combined parts **49** are provided, one on each side of dock **10** where the ends of dock members **17** and **18** abut, with each of these parts **49** being of simple construction, having both one post clamp bracket **24** and one connector **44** therein, while having only one element **28** and socket component **46** respectively secured to different dock members **17** and **18**. This simple construction results from having ear component **48** formed as an integral part of one end of base element **28** of post clamp bracket **24**.

Fifth, each of the two outermost posts **22** on dock member **18** is dropped into ground engagement below water **12** in the position in FIG. 1 by unclamping its associated post clamp bracket bolts **36** and moving, or permitting to move, each post **22** telescopically through its clamp bracket **24** down into the ground engagement into generally the position shown in FIG. 1 in this partially erected and aligned position. This step is performed by having the dock erector walk out on deck **20** of dock member **18**, since it is still supported by float **32**.

Sixth, each of these two posts **22** is reclamped by retightening its clamp bolts **36** after the bottom of each post **22** is in bottom engagement under water **12** in this partially erected and aligned position. Clamping post **22** in ground engagement is desirable now so that there will be no danger of any accidental dropping or tilting of the outer end of dock member **18** any great distance after float **32** has been removed in the tenth step described hereafter.

If dock member **18**, which is preferably made of aluminum, is not too heavy or too long, it may be possible to swing it out over the outer end or edge of dock member **17** into this intermediate position while skipping the aforesaid second, third, fourth, fifth and sixth steps. Then, it would be necessary to extend both posts **22** on member **18** to approximately the erected position depth and reclamp them, as set forth in part of the sixth step, while dock member **18** was still on shore **14**; and it would be necessary to engage sockets **46***b* with ears **48** after dock member **18** were thus outwardly extended into the intermediate position. However, it should be readily apparent that this method of erection of dock member **18** has substantial practical limitations as to weight and size of dock member **18** for ease of handling, as the judging accurately the required downward projection of support posts **22** if water **12** varies in depth, etc.

Seventh, dock deck elevator **50** is attached to one post **22**, such as left hand outermost post **22** in FIG. 1 (with further detail shown in FIGS. 2–4), and to deck **20** for subsequently raising or lowering dock deck **20** relative to this supporting post **22** for moving deck **20** of dock member **18** into the erected and aligned position shown in FIG. 1.

Deck elevator **50** includes suitable dock post bracket part **52** with securing means for detachably securing this bracket part to associated post **22**, and includes elevating means **54** operatively connected to bracket part **52** and detachably connectable with deck **20** of dock member **18** by hook part **56** so that elevating means **54** can move this deck **20** into the erected and aligned position by raising or lowering deck **20** contiguous to this post **22**.

This securing means is specifically shown herein as blind hole socket **52***a* on post bracket part **52** telescopically slidable over the top of post **22** for detachable securement therewith and permitting removal, as will be described in more detail hereafter in the fourteenth step, to put on top of other post **22**.

Elevator **54** includes hook **72** having a sufficiently wide mouth to be detachably hookable under, or engageable with, deck **20** and operatively connected to bracket part **52** by screw and nut connector **58**, comprising screwed together screw **59** and nut **60** being a threaded hole in arm **52***b* of bracket part **52**; operating or rotatable crank **62** secured to the top of screw **59**; and swivel **64** connected between the lower end of screw **59** and the upper end of clevis **66**, and chain **68** connected at its lower end to hook part **56** and at its upper end by hook **72** secured by nut and bolt unit **72** to the bifurcated lower end of clevis **66** welded to swivel **64** so that these component parts **64**, **66**, **68**, **70** and **72** of elevating means **54** are operatively connected between hook part **56** and screw **59** of connector **58**. Then, it should be apparent that rotating crank **62** about the vertical axis of screw **59** will either raise or lower hook part **56** and deck **20**, if it is free to move, depending on the rotation of crank **62**, while not requiring post bracket part **52** or hook part **56** to pivot relative to each other about either a horizontal or vertical axis during relative rotation of screw **59** and nut **60**. It should be apparent that this invention includes within its scope the location of one or both swivel **64** and clevis **66** between post bracket part arm **52***b* and nut **60** if nut **60** were a separate component.

Different shape or size hook parts **56**, adapted to fit different decks **20**, and their associated chains **68** may be interchanged in deck elevator **50** by interchanging their top link of chain **68** on hook **72**.

Hence, this seventh step for attaching deck elevator **50** to post **22** and deck **20** involves telescoping post bracket part socket **52***a* down over the top of associate post **22** and engaging hook part **56** under deck **20** contiguous thereto in any suitable manner, such as by first disengaging the top link of chain **68** from hook **72** to permit easier engagement of hook part **56** with deck **20** and then reengaging this link on hook **72**.

Eighth, after crank **62** is turned to pull hook part **56** tightly up into engagement with the outer left end of deck **20** to take up any slack therebetween, post clamp bolt **36** at the outer left deck end may be loosened to loosen its post **22** to permit vertical relative movement with respect to deck **20** of dock member **18** but with this bolt **36** not loosened sufficiently to open substantially its post clamp bracket **24**. In any event, it is necessary here to be sure that at least the left hand post **22** at the outer end of the dock in FIG. 1 be free to snugly slide vertically in its clamp **24**.

Ninth, the left outer end of deck **20** of dock member **18** is raised upwardly by having deck erector **21** turn crank **62**, as shown in FIG. 2, to free this deck **20** of floating support by float **32** in this partially erected and aligned position.

Tenth, float or float means **32** is removed from under deck **20** of additional dock member **18** by the dock erector lying on the top of this deck and reaching under the deck to pull out this light weight float **32**.

Eleventh, any selected one or both outermost posts **22** may be driven into the bottom of lake or river **12** if necessary by having the dock erector either jump up and down on the outer end of deck **20** of dock member **18** adjacent the selected post to be driven or by hitting the top of the selected post with a sledge hammer while standing on deck **20**. To protect the top of the post during sledge hammer driving, it is desirable to mount thereon post cap **74**, as shown at the right hand end of FIG. 1, having a blindhole socket telescoped over the top of the post or by hitting the top surface **52***c* of post bracket part **52** directly over the top of the selected post. Generally, it is not necessary to drive down any post **24** except the two posts on the right end in FIG. 1. Weight of dock member **18** on one post when deck elevator **50** is used, such as in the twelfth or fifteenth erection steps, will usually perform this post driving function.

Twelfth, the left outer end, edge or corner of deck **20** is raised or lowered in FIG. 1 by deck elevator **50** relative to its left hand supporting post **22** in its dock member supporting position into a partially erected and aligned position by moving left hand portion of deck **20** toward, and preferably into, its aligned and erected position, such as a level position or any other erected or aligned position of any suitable or selected inclination.

Thirteenth, post clamp bolt **36** in the left hand outer

end edge of dock **10** in FIG. 1 is tightened to reclamp left hand outermost post **22** tightly to its deck **20** in this partially erected and aligned position for deck **20**.

Fourteenth, deck elevator **50** is removed from left hand outer post **22** by turning crank **62** in the direction to lower hook part **56** and then telescoping socket **52***a* up off the top of post **22**.

Fifteenth, the right hand outer end, edge or corner of deck **20** is moved into finally erected and aligned postition, such as a level postition, by repeating on the right hand outside end post **22** the seventh, eighth, eleventh, twelfth, thirteenth and fourteenth aforedescribed steps while unclamping in the eighth step and reclamping in the thirteenth step this right hand outermost post on dock member **18** by its post clamp bolt **36** (instead of the outer left hand post and its bolt) with this post in its dock member supporting position so as to be able to support deck **20** in the erected and aligned position after elevator **50** is removed.

It should be apparent that if the outer end edge of the dock member is supported by only one post **22**, this fifteenth erection step is not needed.

If the required vertical movement of either the left or right hand outer end of deck **20** on dock member **18** is too great and only one deck elevator **50** is being used, it may be necessary to go through the aforesaid seventh, eighth, twelfth, thirteenth and/or fourteenth steps several times for both the left and right outer dock ends to reach by a step-wise movement the desired erected and aligned position, or level, of each while avoiding bending of any of the outer end posts **22** by making too great a vertical movement of any one outer corner of this dock **10** at any one particular time.

It should be apparent that on bigger dock installation jobs, such as where saving in erection time is more important than the additional cost of another deck elevator **50**, it would be desirable to use two deck elevators **50** at the same time, one on each post **22** on the outer end of corners of dock **10** in FIG. 1 in performing the aforedescribed seventh through fourteenth steps so as to eliminate the fifteenth step and any necessity for moving the single deck elevator **50** between two posts **22**, as mentioned in the preceding paragraph, to engage with same post **22** more than once since the step-wise movement on the outer end of deck **20**, as described in the preceding paragraph, need not be made because the outer end of deck **20** can now be moved directly to the desired erected and aligned position without disengaging two elevators **50** from these two posts **22**. When using these two elevators **50**, both post clamp bolts **36** associated with these two posts **22** are loosened into unclamping or moved into clamping position simultaneously, as may be required by the aforesaid eighth or thirteenth steps. If two dock erectors are working, both deck elevator cranks **62** may be rotated simultaneously to rapidly move outer end of deck **20** to the desired erected position, but if only one dock erector is involved, he may find it desirable to either try to turn both cranks **62** simultaneously, if deck **20** is narrow enough to permit him to reach both cranks, or rotate the cranks sequentially to move the left and right outer ends of deck **20** in step fashion to the desired erected and aligned position, basically the same as in the aforedescribed twelfth to fifteenth steps but without requiring removal and reattachment of a single elevator **50** repeatedly between the two outer posts **22**.

It should now be apparent that dock member **17** could have been erected by following the same method steps, or suitable modification thereof, as aforedescribed for erecting dock member **18**. However, the aforedescribed fourth step of connecting dock members **17** and **18** together by connectors **44** is not required. Then, the right end of dock member **17** can be secured to shore **14** in any suitable manner. If the right end of dock member **17** is to be secured to shore by some other method, such as a connection to a retaining wall, such connection can be tightened or made now. If right end posts **22** in FIG. 1 are to be used, they may be anchored by performing the step mentioned in the next paragraph.

Two posts **22** on the right hand, or shore, end of dock member **17** in FIG. 1 should now have their post clamp bracket bolts **36** loosened, be driven down into shore **14** by a sledge hammer striking the aforesaid post cap **74** telescoped over the top of the post to prevent damage thereto and be tightened by clamp bolts **36** to lock securely the shore end posts **22** to deck **20** of dock member **17**. Since the dock member **17** had been earlier moved into level or erected position, shore end posts **22** can now be properly driven without putting undue strain on their post brackets **24**.

After dock **10** is installed, it should be apparent that if either dock member **17** or **18** has settled, and especially if settling has been uneven, it is possible to quickly correct this settled condition by realigning members **17** and **18** to bring the effected dock member or members back into the proper erected and aligned position by using one or more deck elevators **50** as a dock realigning means. The knee action at connectors **44** permits relative movement between dock members **17** and **18** during this settling action without damaging any of the component parts and permits during realignment raising or lowering of any corner of these dock members **17** or **18** to correct the settling by using deck elevator **50** for realignment at any of the four outermost posts **22** in FIG. 1 located in water **12**. Elevator **50** can even be used on one of the center posts **22** in FIG. 1 to simultaneously raise or lower both abutting ends of dock members **17** and **18**, if so desired, to realign them.

It should be apparent that it is possible for a single man to erect a complete dock **10**, or to add an extension dock member **18** to an existing dock member **17** then serving as a dock, while working alone and without having the inconvenience or expense of a boat, dock erection helpers, wading or swimming in the water around the dock, or getting wet. He can erect and align a complete dock every spring, and disassemble or take it in every winter or before a flood to protect it from winter or flood damage.

Also, each post clamp base element **28** may be secured to the edge of its associated deck **20** in either of two positions. Ear **48** can protect beyond the end of deck **20**, as shown in FIG. 7 and on dock member **17** to connect dock member **18** thereto, or ear **48** can be the farthest portion of element **28** from the associated end of deck **20**, as shown in FIG. 3 to provide a finished and smooth outer end on dock member **18**. Element **28** can be moved between these two positions by merely turning it end for end, such as by rotating it in a vertical plane about a horizontal axis extending transversely of its associated deck **20**.

It should be apparent that all of the component parts of dock **10** can be shipped in knocked down or disassembled condition for economy and ease of shipping; and one man, acting alone, can erect, assemble, disassemble or take in any one or all dock members **17**, **18**, etc. forming dock **10**.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive with the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by U.S. Letters Patent is:

1. Apparatus and structure for connecting or disconnecting an additional dock member to an existing dock member with their decks aligned for movement between an erected and aligned position and a partially erected position, and for raising or lowering and clamping or unclamping the deck of said additional dock member

relative to its supporting post between an erected and aligned position and a partially erected position, comprising

a dock member post clamp bracket secured to said additional dock member, comprising

a base element secured to one of said dock members and having a recess between its ends,

a post gripper element having a corresponding recess between its ends,

a pair of disengageable connecting means for detachably connecting said elements together with one of said connecting means on each side of said recesses and with said recesses being associated to embrace said dock post therebetween by a clamping action,

one of said connecting means being a bolt and nut type connector for pulling said elements into clamping relationship on said post;

a connector for operatively connecting said two dock members with their decks aligned for movement between said erected and aligned position and a partially erected position, comprising

downwardly opening socket means on the deck of said additional dock member and to be detachably engaged over an ear connector component adapted to be secured on the deck of said existing dock member,

said ear component and socket means being constructed with clearance for providing a free knee-action in a plane extending generally perpendicular to the walkway surface of their decks and extending in the same direction as at least one of said decks so that limited relative movement or misalignment of said decks can occur without damage and so that the additional dock members may be more easily erected and disassembled; and

a dock deck elevator for raising or lowering a dock deck relative to said supporting post for moving the deck of said additional dock member between said erected position and said partially erected position, comprising

a dock post bracket part,

securing means for detachably securing said bracket part to said post,

elevating means operatively connected to said bracket part and detachably connectable with the deck of said additional dock member for moving said last mentioned deck between said erected position and said partially erected position by raising or lowering said last mentioned deck contiguous to said one post.

2. Apparatus and structure, as set forth in claim **1**, with

the other of said connecting means of said clamp bracket being an easily assemblable hinge means providing a fulcrum during clamping of said elements by said one connecting means,

whereby said elements will be held together by said hinge means to prevent loss when in unclamping position, and only said bolt and nut type connector need be tightened in clamping for simplicity of operation.

3. Apparatus and structure, as set forth in claim **1**, with

one of said socket components being secured to said dock member post clamp bracket base element.

4. Apparatus and structure, as set forth in claim **1**, with

said securing means of said deck elevator having a blind hole socket telescopically slidable over the top of said one post for detachable securement therewith,

said elevating means comprising a hook part detachably engageable with said last mentioned deck and operatively connected to said bracket part by a screw and nut connector,

said elevating means including a clevis and swivel operatively connected between at least one of said parts and said connector so that said parts do not have to pivot relatively during relative rotation of said screw and nut in said connector.

5. Apparatus and structure, as set forth in claim **1**, with

the other of said connecting means of said clamp bracket being an easily assemblable hinge means providing a fulcrum during clamping of said elements by said one connecting means,

whereby said elements will be held together by said hinge means to prevent loss when in unclamping position, and only said bolt and nut type connector need be tightened in clamping for simplicity of operation,

one of said ear and socket components being secured to said dock member post clamp bracket base element.

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